

Chapter 12

Calibration

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Calibration

The Calibration function adjusts the instrument so that it can accurately detect and report the activity in your samples. When the instrument is calibrated, you can know that both accuracy and precision will be established.

Accuracy measures exactness and precision measures repeatability. For example, the instrument is accurate when the sample results reported by the instrument reflect the actual levels of activity in all regions of your sample. The instrument is precise when the reported sample results can be duplicated in subsequent runs.

What Calibration Adjusts

In order to achieve both accuracy and precision the Calibration function:

- Adjusts the optimal detector setting and stores the current ambient temperature and atmospheric pressure measurements as base points. (See *Adjusting the Detector Setting* below.)
- Adjusts the optimal group threshold level in the detector.
- Adjusts the optimal channel noise and channel sum thresholds.

Adjusting the Detector Setting

During calibration, the detector setting is adjusted to obtain the detector's known optimal performance (see *The Calibration Source*, below). Since the detector is sensitive to temperature and atmospheric pressure changes, the ambient temperature and atmospheric pressure are stored during each calibration as base reference points for automatic gain adjustment.

During normal operation (after calibration), the system monitors the ambient temperature and atmospheric pressure. The detector setting is then automatically adjusted to compensate for differences between the current ambient conditions and the base point values stored during the last calibration.

Calibration Frequency

You should calibrate the instrument at least once a week. Since changes in gas composition can affect counting sensitivity, you should also calibrate the instrument each time you change the gas bottle. For example, if you calibrated the instrument on Monday, and replaced the gas bottle on Tuesday of the same week, you need to calibrate the instrument again.

After you change the gas bottle it will take some time for the new gas to completely fill the detector. For best results the new gas must completely replace the old gas in the system. How soon you can use the instrument after the bottle change is determined by the presence or absence of counting gas in the detector. Refer to the discussion *Replacing the Gas Bottle* (page R374) for recommendations.

How to Calibrate the Instrument

Packard provides you with a calibration source (see *The Calibration Source*, below). Use this source to calibrate the instrument. Once the calibration is initiated, the system will notify you of its progress. The entire process takes approximately ten minutes to run. Any errors that are encountered will be reported.

Barring errors, no intervention is required.

The calibration procedure is twofold:

1. Load the calibration source.
2. Access the instrument software and initiate the calibration process.

To load the calibration source:

- ☐ Pull out the sample drawer.
- ☐ Place the calibration source on the sample plate.
- ☐ Optionally secure the calibration source to the sample plate with tape.
- ☐ Place the sample cover over the calibration source.
- ☐ Secure the sample cover to the sample plate.
- ☐ Close the sample drawer.

To initiate the calibration process:

- ☐ Select **Calibration** from the **System** menu.

Calibration is initiated.

Calibration Completed

At the conclusion of each calibration step, the calibration source is counted again to verify correct adjustment of all parameters. If the count result reveals a poor adjustment, the procedure is automatically repeated. If any of the parameters cannot be adjusted after several attempts, calibration is aborted and an error message is displayed.

The system will notify you when the calibration process is successfully completed. When it is, open the sample drawer and remove the calibration source.

If no errors were encountered, the instrument should be fully calibrated.

The Calibration Source

The calibration source that you use to calibrate the instrument is placed on the sample tray and loaded into the instrument like any other sample. The calibration source contains many circles of activity that do not necessarily contain matching levels of activity. This is not important for calibration.